

PATENT COOPERATION TREATY
PCT
INTERNATIONAL PRELIMINARY REPORT ON PATENTABILITY

(Chapter II of the Patent Cooperation Treaty)

(PCT Article 36 and Rule 70)

REC'D 08 NOV 2005

Applicant's or agent's file reference 735645	FOR FURTHER ACTION	See Form PCT/IPEA/416
International application No. PCT/AU2004/001807	International filing date (day/month/year) 22 December 2004	Priority date (day/month/year) 24 December 2003
International Patent Classification (IPC) or national classification and IPC Int. Cl. ⁷ C08K 3/22; C09D 133/08, 133/10, 133/12		
Applicant MICRONISERS PTY LTD et al		

1. This report is the international preliminary examination report, established by this International Preliminary Examining Authority under Article 35 and transmitted to the applicant according to Article 36.
2. This REPORT consists of a total of 3 sheets, including this cover sheet.
3. This report is also accompanied by ANNEXES, comprising:
 - a. ☒ (sent to the applicant and to the International Bureau) a total of 2 sheets, as follows:
 - ☒ sheets of the description, claims and/or drawings which have been amended and are the basis for this report and/or sheets containing rectifications authorized by this Authority (see Rule 70.16 and Section 607 of the Administrative Instructions).
 - ☐ sheets which supersede earlier sheets, but which this Authority considers contain an amendment that goes beyond the disclosure in the international application as filed, as indicated in item 4 of Box No. I and the Supplemental Box.
 - b. ☐ (sent to the International Bureau only) a total of (indicate type and number of electronic carrier(s)) , containing a sequence listing and/or table related thereto, in computer readable form only, as indicated in the Supplemental Box Relating to Sequence Listing (see Section 802 of the Administrative Instructions).

4. This report contains indications relating to the following items:

<input checked="" type="checkbox"/> Box No. I	Basis of the report
<input type="checkbox"/> Box No. II	Priority
<input type="checkbox"/> Box No. III	Non-establishment of opinion with regard to novelty, inventive step and industrial applicability
<input type="checkbox"/> Box No. IV	Lack of unity of invention
<input checked="" type="checkbox"/> Box No. V	Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement
<input type="checkbox"/> Box No. VI	Certain documents cited
<input type="checkbox"/> Box No. VII	Certain defects in the international application
<input type="checkbox"/> Box No. VIII	Certain observations on the international application

Date of submission of the demand 18 October 2005	Date of completion of the report 31 October 2005
Name and mailing address of the IPEA/AU AUSTRALIAN PATENT OFFICE PO BOX 200, WODEN ACT 2606, AUSTRALIA E-mail address: pct@ipaaustralia.gov.au Facsimile No. (02) 6285 3929	Authorized Officer ALBERT YONG Telephone No. (02) 6283 2160

INTERNATIONAL PRELIMINARY REPORT ON PATENTABILITY

International application No.

PCT/AU2004/001807

Box No. I Basis of the report

1. With regard to the **language**, this report is based on the international application in the language in which it was filed, unless otherwise indicated under this item.

☐ This report is based on translations from the original language into the following language, which is the language of a translation furnished for the purposes of:

☐ international search (under Rules 12.3 and 23.1 (b))

☐ publication of the international application (under Rule 12.4)

☐ international preliminary examination (under Rules 55.2 and/or 55.3)

2. With regard to the **elements** of the international application, this report is based on (*replacement sheets which have been furnished to the receiving Office in response to an invitation under Article 14 are referred to in this report as "originally filed" and are not annexed to this report*):

☐ the international application as originally filed/furnished

☒ the description:

pages **1, 2, 4-17, 21** as originally filed/furnished

pages* **3** received by this Authority on **18 October 2005** with the letter of 18 October 2005

pages* received by this Authority on with the letter of

☒ the claims:

pages **19** as originally filed/furnished

pages* as amended (together with any statement) under Article 19

pages* **18** received by this Authority on **18 October 2005** with the letter of 18 October 2005

pages* received by this Authority on with the letter of

☒ the drawings:

pages **1/2-2/2** as originally filed/furnished

pages* received by this Authority on with the letter of

pages* received by this Authority on with the letter of

☐ a sequence listing and/or any related table(s) - see Supplemental Box Relating to Sequence Listing.

3. ☐ The amendments have resulted in the cancellation of:

☐ the description, pages

☐ the claims, Nos.

☐ the drawings, sheets/figs

☐ the sequence listing (*specify*):

☐ any table(s) related to the sequence listing (*specify*):

4. ☐ This report has been established as if (some of) the amendments annexed to this report and listed below had not been made, since they have been considered to go beyond the disclosure as filed, as indicated in the Supplemental Box (Rule 70.2(c)).

☐ the description, pages

☐ the claims, Nos.

☐ the drawings, sheets/figs

☐ the sequence listing (*specify*):

☐ any table(s) related to the sequence listing (*specify*):

* If item 4 applies, some or all of those sheets may be marked "superseded."

INTERNATIONAL PRELIMINARY REPORT ON PATENTABILITY

International application No.

PCT/AU2004/001807

Box No. V Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

1. Statement

Novelty (N)	Claims 1-18	YES
	Claims	NO
Inventive step (IS)	Claims 1-18	YES
	Claims	NO
Industrial applicability (IA)	Claims 1-18	YES
	Claims	NO

2. Citations and explanations (Rule 70.7)

D1. EP 1164159: column 3 line 50- column 4 line 5, column 4 line 56-column 5 line 2, column 11 lines 9-10, claims 6 and 7

D2. WO 2002/008599: page 3 line 29 to page 4 line 26, page 5 lines 1-10, page 6 lines 5-23, claims 6 and 14

D3. US 6342556: column 2 lines 10-28, example 1

D4. CN 1412258: abstract

D5. CN 1456614: abstract

D6. CN 1431260: abstract

D7. US 2003/0172845: paragraphs 19, 26 and 30, claim 18

D8. LUESCHER, M., Chapter 27 "Inorganic Pigments", Surface Coatings, Vol. 1, see pages 463-464

NOVELTY (N) AND INVENTIVE STEP (IS)

None of D1-D7 disclose compositions of acrylates comprising nano zinc oxides wherein the acidity of the acrylic composition is less than 0.5g KOH per kilogram of resin solids. Therefore, claims 1-18 are considered novel and inventive in the light of each of D1-D7.

Further, the combination of any of D1-D7 with D8 would not suggest the use of a specific acrylic composition having an acidity of less than 0.5g KOH per kilogram of resin solids, therefore claims 1-18 are considered inventive in the light of these combinations of documents.

The use of physical UV – blockers such as zinc oxide of pigmentary grade (150-200 nm mean particle size) give protection in the region of 190-400 nm and in the visible band. They have been used effectively in UV absorbing acrylic composites. When zinc oxide of 150-200 nm particle size is mixed into an aqueous acrylic emulsion containing free acid groups, the outer part of the particle reacts with the acid to produce a zinc-polyacrylate coating, which protects the zinc oxide core residue from further reaction.

However the use of pigmentary grade zinc oxide of 150-200 nm and larger than 200 nm in aqueous acrylic emulsions (typical levels of 7%) is limited, because it produces milky or opaque films and leads to stability problems causing unwanted viscosity increases and altered rheology with poor can stability, gelling or “livering”.

Summary

In an attempt to improve the stability of clear films and acrylic compositions we conducted experiments using nano size zinc oxide. However we found that the use of nano size zinc oxide with commercial acrylic emulsions does not provide effective UV protection.

We have now found that by using acrylic compositions (or monomers for preparation thereof) with exceedingly low acidity (< 0.5 g KOH/Kg of resin solids) we can use nano size zinc oxide dispersions (with particle size 10-100 nm, preferably 10-50 nm) to give a stable dispersion of zinc oxide for use in a range of coating applications.

Accordingly we provide in a first aspect of the invention an acrylic composition comprising an acrylic component selected from acrylic resins and precursors thereof and a nanoparticulate zinc oxide UV absorber wherein the acidity of the acrylic composition is less than 0.5g KOH per kilogram of resin solids.

CLAIMS:

1. An acrylic composition comprising an acrylic component selected from acrylic resins and precursors thereof and a nanoparticulate zinc oxide UV
5 absorber wherein the acidity of the acrylic composition is less than 0.5g KOH per kilogram of resin solids.
2. An acrylic composition according to claim 1 wherein the zinc oxide component comprises at least 80% by weight of particles of size in the range of
10 from 10 to 100 nm.
3. An acrylic composition according to claim 2 wherein the zinc oxide component comprises at least 90% by weight in the range of from 10 to 50 nm.
- 15 4. A composition according to claim 1 wherein the zinc oxide is present in an amount of from loading 0.5%-50% by weight based on solids in acrylic resin.
5. An acrylic composition according to claim 1 where the acrylic component is selected from the group consisting of resins and monomer compositions for
20 preparation thereof where a significant fraction of the monomeric units are selected from the group consisting of acrylic and methacrylic esters.
6. An acrylic composition according to claim 1 wherein the acrylic component comprises a high molecular weight thermoplastic acrylic resin.
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7. An acrylic composition according to claim 1 wherein the acrylic component comprises a thermo setting acrylic resin or non-aqueous dispersion (NAD) acrylic which is a thermosetting solution.
- 30 8. An acrylic composition according to claim 1 in the form of an oil in water emulsion.